Outcome after surgery for prosthetic valve endocarditis and the impact of preoperative treatment

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Objectives: This study examined the outcomes of surgery for active prosthetic valve endocarditis in a recent decade, with special interest in preoperative treatment and predictors for early and late events.

Methods: From 2000 to 2010, a cohort of 149 consecutive patients (mean age, 64 ± 13.9 years; 72% were male) underwent redo-surgery for prosthetic valve endocarditis and were reviewed regarding early (≤60 days) and late (>60 days) events (death, reinfection, reoperation). Kaplan–Meier survival curves and Cox regression analysis were used to investigate the impact of preoperative intervals and predictors for events, respectively.

Results: Preoperative status was critical (European System for Cardiac Operative Risk Evaluation >20%) in 121 patients (81.2%). Staphylococci were the most common infecting microorganisms (27.5%). The median interval between onset of symptoms and diagnosis and between diagnosis and operation was 2 days (interquartile range, 1-5) and 8 days (interquartile range, 2-23), respectively. Operative mortality (≤30 days) was 12.8%. Mean follow-up was 4 ± 2.9 years. In 53 patients, 47 early (24 deaths, 14 recurrences, 9 reoperations) and 22 late events (11 deaths, 9 recurrences, 2 reoperations) occurred. Overall and event-free survivals at 10 years were 75% ± 3.8% and 64% ± 4.0%, respectively. Freedom from recurrent infection and reoperation at 10 years were 81% ± 3.6% and 91% ± 2.6%, respectively. In multivariate Cox regression, mechanical circulatory support, prolongation between onset of symptoms and diagnosis more than 30 days, and preoperative presence of renal failure predicted early events, and double valve replacement predicted late events.

Conclusions: Cardiac and renal function, need for double valve replacement, and preoperative treatment predicted outcomes. A prolonged interval in which patients were left untreated while symptomatic, but not prolongation of preoperative antibiotic treatment, increased risk. (J Thorac Cardiovasc Surg 2014;148:2052-9)

Prosthetic valve endocarditis (PVE), a severe complication of heart valve surgery and the most severe form of infective endocarditis (IE), is associated with significant morbidity and mortality.[1-8] PVE accounts for 10% to 30% of all cases of IE and occurs in 1% to 6% of patients with valve prostheses, equally affecting mechanical and biological valves.[3,9-11]

Despite improvements in echocardiography, increasing knowledge, and periodically reviewed multidisciplinary guidelines, there are still difficulties in the diagnosis of PVE, because the clinical presentation is rather atypical and blood cultures and echocardiography results are frequently negative.[5,11] Although there is consensus that surgery is required in complicated PVE (heart failure, severe prosthetic dysfunction, abscess/fistula, persisting fever, aggressive microorganisms, large vegetations), there is an ongoing discussion about general therapeutic strategies.[4,5,11] For left-sided native valve IE, data from a randomized study in 76 patients with severe valve disease and large vegetations demonstrated a significant reduction of the composite end point of death from any cause and embolic events by early surgery versus conventional treatment,[12] but data regarding PVE are conflicting. Lalani and colleagues[13] recently showed that after adjustment for differences in clinical characteristics and survival bias in 1025 patients with PVE, early valve replacement was not associated with lower mortality compared with medical therapy in the overall cohort.

Therefore, we reviewed our experience of surgery for PVE during the most recent decade. With respect to death, recurrent infection, and reoperation, early and late events were analyzed and the impact of preoperative time delay between onset of symptoms and diagnosis and between diagnosis and operation was investigated. Furthermore, we sought to identify independent predictors for early and late events.

METHODS

Patients

With approval from our institutional Ethics Committee (EA1/032/13), we performed a retrospective review of consecutive patients who underwent

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Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Feb 24, 2014; revisions received April 22, 2014; accepted for publication May 9, 2014; available ahead of print June 18, 2014.

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0022-5223/$36.00

http://dx.doi.org/10.1016/j.jtcvs.2014.05.025

Abbreviations and Acronyms
IE = infective endocarditis
IQR = interquartile range
PVE = prosthetic valve endocarditis

redo-surgery for PVE at the Department of Cardiovascular Surgery at Charité Campus Mitte, Berlin, between 2000 and 2010. We identified 149 patients (107 male, 42 female) with a mean age of 63.5 ± 13.8 years (range, 26-83). Among them, 65 (43.3%) presented with early and 84 (56.4%) presented with late PVE. The median time between first valvular surgery and reoperation was 4.1 years (interquartile range [IQR], 0.3-5.9) for all patients, 3 months (IQR, 1.7-6.7) for early PVE, and 4.9 years (IQR, 2.9-9.9) for late PVE. Primary surgery was due to IE in 26 patients (40.0%) and 15 patients (17.9%) with early and late PVE.

Definitions

Diagnosis of PVE was based on clinical findings (fever, inflammatory syndromes), laboratory testing (blood cultures, leukocytosis, levels of C-reactive protein and procalcitonin), results of transthoracic/transesophageal echocardiography, and intraoperative findings.[11,14] According to the Guidelines of the European Society of Cardiology, PVE occurring within 1 year of primary valvular surgery was classified as early and beyond 1 year as late.[11] Culture-negative endocarditis was present when no microorganism could be identified, neither in serial blood cultures nor in cultures from the explanted material despite the presence of characteristic signs for endocarditis (vegetations, periprosthetic destructions, or pus). Clinical variables were defined according to the terms of the Society of Thoracic Surgeons National Cardiac Surgery Database. For perioperative risk assessment, Society of Thoracic Surgeons and logistic European System for Cardiac Operative Risk Evaluation scores were determined.[15,16] PVE predispositions were classified following the criteria proposed by Grinda and colleagues.[17] Endocarditis was considered locally uncontrolled when the infectious pathology extended beyond the prosthetic valve (ie, destruction or purulent deformation of adjacent tissue, periprosthetic abscesses, and fistulas into a cardiac chamber or pericardium). Concomitant procedures were all surgical procedures performed to correct associated noninfective cardiac diseases. Events were defined by death, recurrent PVE, and reoperation. Prolonged hospital stays were classified as early if they occurred within 60 days after surgery or late if they occurred thereafter.

Surgery and Postoperative Treatment

The most common indications for surgery were vegetations greater than 10 mm (n = 109, 73.2%), locally uncontrolled infection (n = 90, 60.4%), and heart failure (n = 65, 43.6%), which was caused by severe prosthetic valve dysfunction (n = 61) or fistulas (n = 4). More than 1 indication for surgery was present in 78 patients (52.3%).

All operations were performed through a median sternotomy using an oscillating saw. Cardiopulmonary bypass, installed via cannulation of the distal ascending aorta, the aortic arch or femoral artery, and the right atrium or femoral vein, was used with systemic normothermia or mild hypothermia (32°C) if a patent thoracic artery bypass was present. Myocardial protection was achieved with intermittent antegrade blood cardioplegia. Previously implanted prostheses were removed in total, and abscesses and fistulas were thoroughly debrided. The remaining tissue was disinfected using povidone-iodine solution. In the presence of large abscess cavities, fistulas, or tissue defects, a pericardial (autologous, bovine or equine) patch repair was performed. The choice for the new prosthesis was at the discretion of the surgeon. Concomitant procedures, if needed, were performed according to standard techniques. Infected intravascular catheters were removed before surgery.

All patients underwent intravenous antibiotic/antimycotic treatment for at least 6 weeks postoperatively. Antibiotic regimen was directed by microbiological findings and based on guidelines.[11] In the case of culture-negative PVE, an empirical, broad-range, antibiotic treatment was initiated, usually consisting of vancomycin, rifampicin, and gentamycin.

Follow-up

Follow-up was obtained by telephone interviews and mail questionnaire. Complications were confirmed by contact with the patient's cardiologist or family physician. In case of rehospitalizations, copies of the medical reports were obtained.

Statistical Analysis

Categoric variables are reported as absolute and relative frequencies. For continuous data, means and standard deviations or medians and interquartile ranges were calculated. For comparison of microbiological findings in patients presenting with early and late PVE, the Fisher chi-square test was used. Overall and event-free survival, and freedom from recurrence and reoperation were analyzed using Kaplan–Meier curves and log-rank test. A Cox regression analysis was used to identify predictors for early and late events. First, a univariate approach evaluating all possible risk factors was applied, followed by a multiple Cox regression (backward elimination; likelihood ratio) of all significant variables. Aikaike's information criterion was used to assess the goodness of fit. The assumption of proportional hazard was checked. All the statistical analyses were performed using SPSS Statistics 19 for Windows (SPSS Inc, Chicago, Ill) and supervised by an independent statistician (K.-D.W.). Because of the exploratory nature of the study, no adjustment for multiple testing was carried out.

RESULTS

Baseline Characteristics

Preoperative status was critical in a significant number of patients (Table 1): sepsis (n = 23), shock (n = 14), acute renal failure (n = 17), and the necessity of mechanical ventilation (n = 17) and pharmacologic circulatory support (n = 19). Accordingly, logistic European System for Cardiac Operative Risk Evaluation was greater than 20% in 121 patients (81.2%). A total of 49 patients (32.9%) sustained 1 or multiple embolic complications involving 1 or more systems: brain including retina (n = 28), mesenteric circulation including spleen (n = 14), upper or lower limbs (n = 11), kidneys (n = 6), and coronary arteries (n = 5). Extracardiac infection was present in 31 patients (20.8%), including pneumonia or pulmonic abscess (n = 7), skin or soft tissue infection (n = 6), urogenital infection (n = 5), spondylodiscitis and nonsternal osteomyelitis (n = 5), intra-abdominal infection or abscess (n = 3), surgical site infection after primary cardiac surgery (n = 3), and infected intravascular catheters (n = 2). One or more extracardiac predispositions for IE were found in 51 patients (39.6%), including diabetes (n = 38), intravenous drug abuse (n = 9), alcoholism (n = 6), corticotherapy (n = 4), chemotherapy (n = 3), leukemia (n = 1), and chronic hemodialysis (n = 4).

Preoperative Time Intervals

Median time intervals between onset of symptoms and diagnosis and between diagnosis and operation were